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## MEMORANDUM

LIFT, DRAG, AND PITCHING MOMENT OF AN ASPECT-RATIO-2

TRIANGULAR WING WITH LEADING-EDGE FLAPS

DESIGNED TO SIMULATE CONICAL CAMBER

By Gene P. Menees

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# NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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SUMMARY

An investigation was conducted to determine the effectiveness of leading-edge flaps in reducing the drag at lifting conditions of a triangular wing of aspect ratio 2.0. The flaps, deflected to simulate conically cambered wings having a wide range of design lift coefficients, were tested over a Mach number range of 0.70 to 2.22 through an angle-of-attack variation from  $-6^{\circ}$  to  $+18^{\circ}$  at a constant Reynolds number of 3.68 million based on the wing mean aerodynamic chord. A symmetrical wing of the same plan form and aspect ratio was also tested to provide a basis for comparison.

The experimental results showed that with the flaps in the undeflected position, a small amount of fixed leading-edge droop incorporated over the outboard 5 percent of the wing semispan was as effective at high subsonic speeds as conical camber in improving the maximum lift-drag ratio above that of the symmetrical wing. At supersonic speeds, the penalty in minimum drag above that of the symmetrical wing was less than that incurred by conical camber. Deflecting the leading-edge flaps about the hinge line through 80 percent of the wing semispan resulted in further improvements of the drag characteristics at lift coefficients above 0.20 throughout the Mach number range investigated. The lift and pitching-moment characteristics were not significantly affected by the leading-edge flaps.

INTRODUCTION

Numerous theoretical and experimental studies have been made to develop a means of reducing the drag due to lift of aircraft in cruising flight. The effectiveness of the conical form of camber in achieving this result at subsonic and transonic speeds has been demonstrated experimentally in references 1 and 2 for several swept and triangular wings. However, as was shown in these references, conical cambered surfaces produce undesirable penalties in minimum drag at supersonic speeds. To

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obtain the best over-all performance characteristics of wings incorporating conical camber, a means was sought for alleviating the adverse characteristics at supersonic speeds while retaining the benefits at high subsonic speeds. One method of realizing this objective would be through the utilization of leading-edge flaps, designed to simulate the effects of conical camber when deflected. At subsonic speeds such leading-edge flaps could be deflected to achieve the beneficial reduction of drag due to lift and high lift-drag ratio attributed to conical camber, while at supersonic speeds the flaps could be retracted to the plane of the wing to alleviate the undesirable effects of conical camber. The experimental results of a similar investigation showing the effects of a leading-edge flap, designed to approximate conical camber, on the aerodynamic characteristics of a  $45^\circ$  sweptback wing having an aspect ratio of 3 are reported in reference 3.

To study the validity of these considerations further, an investigation of an aspect-ratio-2 triangular wing with and without leading-edge flaps was undertaken in the Ames 6- by 6-foot supersonic wind tunnel. A measure of the effectiveness of the leading-edge flaps was provided by comparing the experimental results with the data of reference 2 for a conically cambered triangular wing of aspect ratio 2.

#### NOTATION

$b$	wing span, ft
$\bar{c}$	mean aerodynamic chord of wing, ft
$C_D$	drag coefficient, $\frac{\text{drag}}{qS}$
$\Delta C_D$	drag coefficient increment, drag coefficient of leading-edge flap configuration or cambered wing minus drag coefficient of symmetrical wing for constant lift coefficient
$C_L$	lift coefficient, $\frac{\text{lift}}{qS}$
$C_{L_d}$	design lift coefficient
$C_{L_{opt}}$	optimum lift coefficient, lift coefficient for maximum lift-drag ratio
$C_m$	pitching-moment coefficient, referred to quarter point of the mean aerodynamic chord, $\frac{\text{pitching moment}}{qS\bar{c}}$
$\frac{L}{D}$	lift-drag ratio

$\left(\frac{L}{D}\right)_{\max}$	maximum lift-drag ratio
M	free-stream Mach number
q	free-stream dynamic pressure, lb/sq ft
S	wing area formed by extending the leading and trailing edges to the vertical plane of symmetry, sq ft
x,y,z	Cartesian coordinates in streamwise, spanwise, and vertical directions, respectively (The origin is at the wing apex.)
$\alpha$	angle of attack of wing root chord
$\delta$	angle of flap deflection in streamwise direction with respect to root chord plane of wing (positive for leading-edge up)
$\theta$	angle of flap deflection perpendicular to hinge line with respect to root chord plane of wing (positive for leading-edge up)

## APPARATUS AND MODEL

### Test Facility

The experimental investigation was conducted in the Ames 6- by 6-foot supersonic wind tunnel which is a closed-circuit, variable-pressure type tunnel with a Mach number range continuous from 0.70 to 2.24. The transonic capabilities of the facility are the result of recent modifications wherein the test-section floor and ceiling were perforated and a boundary-layer removal system installed to maintain uniform flow at transonic and low supersonic speeds. The modifications also included the installation of injector flaps downstream of the test section to extend the upper Mach number limit by reducing the required compression ratio across the nozzle and by better matching the weight flow characteristics of the nozzle with those of the compressor.

An extensive survey of the wind-tunnel stream characteristics was made upon completion of the modifications. Analysis of these results, although incomplete, is sufficiently advanced to establish the validity of the results of the present investigation. A discussion of the various corrections applied to the data is included under the section "Tests and Procedures."

## Description of Model

The sting-supported model consisted of a Sears-Haack body of 12.5 fineness ratio and an aspect-ratio-2.0 triangular wing having leading-edge flaps designed to simulate conical camber. The triangular wing had standard NACA 0003-63 streamwise sections. The aftersection of the fuselage was truncated as shown in figure 1(a) to accommodate the sting and six-component strain-gage balance which measured forces and moments acting on the model. The wing, including the leading-edge flaps, was of solid steel construction to minimize aeroelastic effects. The surfaces were polished smooth and further treated to prevent corrosion.

The leading-edge flaps were constructed to simulate conical camber as closely as possible. To accomplish this most effectively, leading-edge flaps with several hinge lines would be required, permitting the various sections of the flap to be deflected in combination to achieve a shape approximating conical camber. However, because of structural limitations of the wing used in the present investigation, the use of leading-edge flaps with more than one hinge line was prohibited. Thus, to simulate conical camber by means of leading-edge flaps restricted to one hinge line, it was necessary to provide the flaps with various amounts of droop near the leading edge. In the present investigation, three sets of interchangeable leading-edge flaps, each having a different streamwise droop over the outboard 5 percent of the symmetrical wing semispan, were used. The flaps were attached to the wing at four positions along a ray through 80 percent of the semispan and could be deflected at angles of  $0^\circ$ ,  $-5^\circ$ ,  $-10^\circ$ , and  $-15^\circ$  perpendicular to the hinge line by means of angled brackets. The gap at the hinge line was sealed during testing.

The shape of the drooped portion of the leading-edge flaps was derived from the ordinates of the outboard 5 percent of a conically cambered triangular wing of aspect ratio 2.0 designed for a lift coefficient of 0.215 at a Mach number of 1.0. A perpendicular to the tangent of the mean chord line at 95 percent of the semispan of the cambered wing was rotated to the vertical (see fig. 1(b)), and the resulting cambered shape formed the drooped portion of the flap designated No. 1 (see fig. 1(c)). Deflections of  $-5^\circ$  and  $-7.5^\circ$ , respectively, were imposed on the drooped shape of flap No. 1 to obtain the shapes for the flaps designated as No. 2 and No. 3 (see fig. 1(c)). The slight discontinuities between the drooped and symmetrical portions of the flaps resulting from this procedure were faired to form a smooth contour. The ordinates of the mean camber lines for the various deflections of flap No. 1 about the 80-percent hinge line as well as those for the conically cambered wing having a design lift coefficient of 0.215 at a Mach number of 1.0 are shown in figure 1(d).

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## TESTS AND PROCEDURES

### Range of Test Variables

Experimental data were taken at Mach numbers of 0.70, 0.90, 1.00, 1.30, 1.70, and 2.22 through an angle-of-attack range from  $-6^{\circ}$  to  $+18^{\circ}$  at a constant Reynolds number of 3.68 million based on the wing mean aerodynamic chord. Nine combinations of angled brackets and leading-edge flaps, selected to simulate conically cambered wings having a wide range of design lift coefficients, were tested. The configurations investigated and the corresponding deflections perpendicular to the hinge line and streamwise are tabulated in the following table:

Configuration	$\theta$ , deg	$\delta$ , deg
Flap No. 1	0	0
	-5	-1.86
	-10	-3.72
	-15	-5.58
Flap No. 2	0	0
	-5	-1.86
	-10	-3.72
	-15	-5.58
Flap No. 3	-15	-5.58

At the low Reynolds numbers at which most wind tunnels operate, extensive regions of laminar flow can exist on wings when no lift is developed. At lifting conditions the boundary-layer transition point moves, because of changes in the pressure gradients acting over the wings, causing a variation in the friction drag which is difficult to evaluate and, moreover, not necessarily representative of full scale. To isolate the effects of the leading-edge flaps on the drag due to lift characteristics it is necessary to minimize the change in friction drag with changing lift coefficient. In the present investigation this was accomplished by inducing transition at fixed locations on the wings and body by means of 0.010-inch-diameter wires located as shown in figure 1(a). The wire size was selected on the basis of the results of reference 4 wherein it was shown that such a device was effective in promoting turbulent flow. Although there is no conclusive evidence as to the magnitude of the form drag-coefficient increment contributed by the transition wires, previous studies have indicated this increment to be not more than 0.0010. All data presented herein are with the transition wires on.

## Reduction of Data

The data presented herein have been reduced to standard NACA coefficient form. The aerodynamic coefficients were referred to the wind axes, and the reference center of moments was located at the quarter point of the wing mean aerodynamic chord. Factors which affect the accuracy of the results are discussed in the following paragraphs.

Stream variations.- Surveys of the stream characteristics of the Ames 6- by 6-foot supersonic wind tunnel showed that, in the region of the test section, essentially no stream curvature existed along the tunnel center line in the vertical plane (pitch plane of the model) and that the axial static-pressure variations were usually less than  $\pm 1$  percent of the dynamic pressure. This static-pressure variation resulted in negligible longitudinal-buoyancy corrections to the drag of this model. On the basis of these findings no corrections for stream curvature or static-pressure variation were made in the present investigation.

The results of these surveys also showed that a stream angle existed along the tunnel center line in the vertical plane. Similar results showing a stream angle of less than  $\pm 0.3^\circ$  throughout the Mach number range investigated were obtained from tests of the model mounted in the upright and inverted positions on the tunnel center line and pitched in the vertical plane. The data presented herein have been corrected for these stream angles.

Support interference.- The effects of model support interference on the aerodynamic characteristics were considered to consist primarily of a change in the pressure at the base of the model. The drag data presented herein contain no base drag component since the base pressure was measured and the drag was adjusted to correspond to that in which the base pressure is equal to the free-stream static pressure; therefore, no corrections were made to take into account support interference.

Tunnel-wall interference.- The effectiveness of the perforations in the wind-tunnel test section in preventing choking and absorbing reflected disturbances at transonic and low supersonic speeds has been established experimentally. Unpublished data from the wind-tunnel calibration indicate that reliable data can be obtained throughout the Mach number range if certain restrictions are imposed on the model size and attitude. The configuration and methods of testing used in the present investigation conform to these restrictions so that the data at transonic and low supersonic speeds are reasonably free of interference effects. Thus, no corrections for wall interference have been made.

## RESULTS AND DISCUSSION

The purpose of this investigation was to determine the effectiveness of leading-edge flaps, designed to simulate the effects of conical camber, in reducing the drag at lifting conditions of an aspect-ratio-2.0 triangular wing. A cursory analysis of the experimental results showed that the flap having the smallest amount of leading-edge droop, which is designated as Flap No. 1, was the most effective of the three tested in reducing the drag. Increasing the leading-edge droop resulted in no additional benefits of significance, particularly in the region of maximum lift-drag ratio. Therefore, in the discussion which follows, only the flap with the smallest leading-edge droop is considered. Tabulated results for all configurations tested are given in tables I through IV.

Graphical results are presented in figures 2 through 8. Basic drag, lift, and moment data appear in figures 2, 7, and 8, respectively. Selected data summarizing the effects of the leading-edge flaps on the drag characteristics are presented in figures 3 through 6. The experimental results obtained from reference 2 for an aspect-ratio-2.0 triangular wing incorporating conical camber, designed for a lift coefficient of 0.215 at a Mach number of 1.0, are also presented in figures 3 through 6 for comparative purposes. It should be noted that the data of reference 2 were obtained at a Reynolds number of 5.6 million and that transonic data are not available.

## Drag Characteristics

A comparison of the drag characteristics for the various deflections of the leading-edge flap with those of the symmetrical wing shown in figure 2 shows substantial reductions in drag coefficient above a lift coefficient of 0.10 at high subsonic and transonic speeds. Some improvement is also evident at the low supersonic speeds at high lift coefficients. However, no significant effect is discernible at the higher supersonic Mach number. Cross plots of the results of figure 2 comparing the drag increment above or below that of the symmetrical wing for the flaps deflected at streamwise angles of  $0^\circ$  and  $-5.58^\circ$  with the results of the conically cambered wing of reference 2 appear in figures 3 and 4. These data show that with the flaps in the undeflected position ( $\delta = 0^\circ$ ), the small leading-edge droop was as effective in reducing drag at a lift coefficient of 0.20 as the fully cambered wing. Furthermore, as shown in figure 3, this improvement of the drag characteristics was achieved with less penalty in the minimum drag at all supersonic speeds than was incurred for the conically cambered wing, the maximum increase in minimum drag being 0.0016 at a Mach number of 2.22. It may be seen from figure 4 that the flap in the undeflected position was more effective in reducing the drag up to a lift coefficient of approximately 0.20 than the deflected flap. However, deflecting the flap about

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the hinge line was effective in further improving the drag characteristics at the higher lift coefficients throughout the Mach number range investigated. This effect is also readily seen from the data of figure 3 wherein the results for the flap deflected at a streamwise angle of  $-5.58^\circ$  show substantially larger drag reductions at lift coefficients of 0.40 and 0.60 than those for the flap in the undeflected position. This result is in qualitative agreement with the data of reference 3 for a sweptback wing having a leading-edge flap designed to approximate conical camber wherein it was shown that at high subsonic speeds the larger flap deflections generally provided the greater drag reductions at lift coefficients of 0.40 and 0.60. It is evident that on a full-scale aircraft it may be possible to program the deflection of the leading-edge flaps to take advantage of the optimum drag characteristics at arbitrary lift coefficients and Mach numbers.

To illustrate further the effectiveness of the leading-edge flaps in improving the drag characteristics, the results of figures 5 and 6 are presented wherein the lift-drag-ratio characteristics of the leading-edge flaps deflected at streamwise angles of  $0^\circ$  and  $-5.58^\circ$  are compared with those of the symmetrical and conically cambered wings. Perhaps the most significant effect is that both leading-edge flap configurations realize substantial improvements in the maximum lift-drag ratio above that of the symmetrical wing at high subsonic and transonic speeds. Further, as shown in figure 6, which presents the variation of maximum lift-drag ratio with Mach number, the improvement in maximum lift-drag ratio resulting from the small leading-edge droop incorporated into the flaps was comparable to that of the fully cambered wing. The flap deflected at a streamwise angle of  $-5.58^\circ$  realized values which were slightly lower since, as pointed out previously, this configuration was most effective in reducing drag at lift coefficients above the optimum lift. It is interesting to note from figure 5, however, that although the flap in the undeflected position realizes maximum lift-drag ratios equivalent to those of the conically cambered wing, both the cambered wing and flap deflected at a streamwise angle of  $-5.58^\circ$  become superior at lift coefficients above the optimum. Also, at high subsonic and transonic speeds the results for the flap in the undeflected position show a more rapid decrease in lift-drag ratio with increase in lift coefficient above the optimum than do those for the flap deflected at a streamwise angle of  $-5.58^\circ$ . Thus, a larger variation in lift is possible for the deflected flap while still maintaining near maximum lift-drag ratio.

#### Lift and Moment Characteristics

The data of figures 7 and 8 show the leading-edge flaps to have no adverse effects on the lift and pitching-moment characteristics of the test model. The well-known facts that the aerodynamic center and lift-curve slope near zero lift are primarily functions of wing plan form and are not influenced by provisions for camber are substantiated. The lift and

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pitching-moment curves of the wing with leading-edge flaps deflected are displaced slightly but are essentially parallel with those of the symmetrical wing.

### CONCLUSIONS

An investigation directed at determining the effectiveness of leading-edge flaps, designed to simulate the effects of conical camber, in reducing the drag at lifting conditions of a triangular wing of aspect ratio 2.0 has been conducted in the Ames 6- by 6-foot supersonic wind tunnel. The results of this study showed:

1. With the flaps in the undeflected position, a small amount of fixed leading-edge droop incorporated over the outboard 5 percent of the wing semispan was as effective at high subsonic speeds as conical camber in improving the maximum lift-drag ratio above that of the symmetrical wing. At supersonic speeds, the penalty in minimum drag above that of the symmetrical wing was less than that incurred by conical camber.

2. Deflecting the leading-edge flaps about the hinge line through 80 percent of the wing semispan resulted in further improvements of the drag characteristics at lift coefficients above 0.20 throughout the Mach number range investigated.

3. The lift and pitching-moment characteristics were not significantly affected by the leading-edge flaps.

Ames Research Center  
National Aeronautics and Space Administration  
Moffett Field, Calif., June 9, 1958

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TABLE I.- AERODYNAMIC CHARACTERISTICS OF THE SYMMETRICAL WING  
CONFIGURATION

M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$	M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$
0.70	-6.3	-0.307	0.0378	0.0472	1.30	-6.1	-0.286	0.0400	0.0735
	-4.3	-.200	.0206	.0311		-4.0	-.185	.0236	.0473
	-2.3	-.099	.0117	.0157		-2.0	-.086	.0150	.0224
	-.8	-.040	.0095	.0094		-.5	-.024	.0131	.0093
	-.3	-.018	.0087	.0066		-.1	0	.0130	.0016
	.2	.004	.0091	.0047		.5	.018	.0131	-.0047
	1.7	.065	.0101	-.0035		2.0	.089	.0154	-.0204
	3.7	.162	.0165	-.0181		3.9	.183	.0229	-.0443
	5.7	.264	.0305	-.0324		6.0	.282	.0389	-.0696
	7.8	.376	.0534	-.0489		8.0	.379	.0612	-.0925
	9.8	.489	.0845	-.0634		10.0	.475	.0906	-.1159
	11.7	.602	.1229	-.0789		12.0	.564	.1253	-.1381
	13.7	.715	.1700	-.0942		13.9	.653	.1659	-.1603
	15.7	.829	.2259	-.1074		16.0	.738	.2131	-.1805
	17.7	.934	.2881	-.1187		18.0	.820	.2662	-.1990
0.90	-6.0	-.326	.0399	.0607	1.70	-6.3	-.236	.0357	.0586
	-4.0	-.206	.0211	.0379		-4.3	-.162	.0229	.0400
	-2.0	-.097	.0119	.0185		-2.2	-.078	.0147	.0200
	-.5	-.031	.0096	.0095		-.8	-.027	.0126	.0070
	0	-.010	.0094	.0060		-.2	-.007	.0123	.0026
	2.0	.084	.0108	-.0084		.3	.012	.0125	-.0025
	4.0	.190	.0202	-.0276		1.8	.068	.0141	-.0148
	6.0	.305	.0371	-.0488		3.8	.144	.0205	-.0338
	8.0	.436	.0657	-.0766		5.8	.219	.0319	-.0510
	10.0	.556	.1008	-.1053		7.8	.294	.0494	-.0690
	12.0	.683	.1476	-.1315		9.8	.365	.0711	-.0853
	14.0	.804	.2018	-.1609		11.8	.432	.0974	-.1014
	16.0	.936	.2699	-.1944		13.7	.498	.1277	-.1165
						15.8	.567	.1646	-.1302
1.00	-5.9	-.338	.0483	.0845	2.22	17.8	.632	.2054	-.1414
	-3.8	-.212	.0253	.0533		-5.8	-.173	.0274	.0383
	-1.8	-.094	.0191	.0236		-3.8	-.114	.0177	.0252
	-.3	-.021	.0145	.0067		-1.7	-.050	.0122	.0114
	.7	.031	.0147	-.0049		-.2	-.006	.0109	.0017
	2.1	.110	.0179	-.0236		.3	.009	.0109	-.0013
	4.1	.233	.0346	-.0533		.7	.024	.0111	-.0042
	6.2	.348	.0489	-.0827		2.2	.070	.0131	-.0145
	8.2	.471	.0799	-.1118		4.2	.130	.0195	-.0281
	10.2	.584	.1150	-.1386		6.2	.187	.0298	-.0407
	12.1	.694	.1589	-.1639		8.3	.244	.0443	-.0529
	14.2	.799	.2107	-.1907		10.2	.297	.0615	-.0632
	16.2	.906	.2707	-.2163		12.2	.351	.0834	-.0737
	18.2	.997	.3351	-.2385		14.2	.406	.1091	-.0823
						16.2	.463	.1399	-.0909
						18.2	.514	.1747	-.0997

TABLE II.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH  
FLAP NUMBER 1  
(a)  $\theta = 0^\circ$  or  $\delta = 0^\circ$

M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$	M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$
0.70	-6.3	-0.317	0.0424	0.0508	1.30	-6.1	-0.293	0.0441	0.0756
	-4.2	-.209	.0243	.0349		-4.0	-.194	.0273	.0504
	-2.2	-.105	.0139	.0188		-1.9	-.091	.0172	.0239
	-.7	-.034	.0105	.0076		-.4	-.018	.0140	.0052
	-.3	-.011	.0099	.0040		0	.002	.0139	-.0003
	.4	.017	.0095	-.0008		.6	.032	.0138	-.0081
	1.8	.085	.0101	-.0107		2.1	.103	.0155	-.0264
	3.9	.181	.0140	-.0251		4.2	.202	.0237	-.0520
	5.9	.289	.0290	-.0420		6.1	.296	.0381	-.0764
	7.8	.404	.0543	-.0585		8.1	.398	.0625	-.1018
	9.9	.524	.0876	-.0740		10.2	.494	.0928	-.1253
	11.9	.639	.1286	-.0899		12.2	.588	.1304	-.1486
	13.9	.760	.1795	-.1080		14.2	.685	.1752	-.1730
	16.0	.870	.2372	-.1199		16.1	.759	.2196	-.1904
	17.9	.960	.2979	-.1288		18.3	.848	.2783	-.2105
0.90	-6.0	-.336	.0441	.0675	1.70	-6.2	-.238	.0391	.0594
	-3.9	-.214	.0245	.0427		-4.2	-.162	.0254	.0408
	-1.9	-.099	.0134	.0204		-2.1	-.082	.0168	.0211
	-.5	-.027	.0099	.0069		-.6	-.025	.0140	.0063
	.1	.003	.0098	.0014		-.2	-.007	.0134	.0020
	.5	.028	.0091	-.0032		.5	.018	.0134	-.0040
	2.0	.104	.0105	-.0171		2.0	.078	.0152	-.0191
	4.2	.213	.0174	-.0374		3.9	.150	.0213	-.0385
	6.1	.333	.0365	-.0611		5.9	.226	.0326	-.0555
	8.2	.481	.0697	-.0946		7.9	.301	.0492	-.0731
	10.2	.602	.1067	-.1192		9.9	.375	.0722	-.0906
	12.2	.737	.1576	-.1531		12.0	.447	.1008	-.1074
	14.1	.860	.2142	-.1835		13.9	.514	.1320	-.1223
	16.3	.983	.2849	-.2169		16.0	.582	.1696	-.1360
						18.0	.646	.2124	-.1471
1.00	-5.8	-.341	.0469	.0877	2.22	-5.7	-.172	.0294	.0390
	-3.8	-.217	.0295	.0574		-4.2	-.116	.0204	.0267
	-1.8	-.103	.0187	.0283		-1.7	-.054	.0138	.0126
	-.3	-.017	.0147	.0059		-.2	-.006	.0120	.0013
	.3	.014	.0148	-.0024		.3	.011	.0120	-.0021
	.8	.049	.0145	-.0113		.9	.028	.0122	-.0063
	2.3	.126	.0177	-.0335		2.3	.076	.0143	-.0172
	4.4	.250	.0259	-.0625		4.3	.133	.0202	-.0303
	6.3	.369	.0490	-.0945		6.3	.192	.0304	-.0431
	8.4	.506	.0799	-.1273		8.3	.251	.0448	-.0552
	10.3	.625	.1194	-.1555		10.4	.308	.0635	-.0665
	12.4	.742	.1675	-.1835		12.4	.364	.0857	-.0769
	14.3	.846	.2200	-.2078		14.4	.418	.1126	-.0857
	16.5	.952	.2845	-.2326		16.5	.473	.1446	-.0944
	18.4	1.044	.3515	-.2543		18.5	.526	.1801	-.1035

TABLE II.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH  
 FLAP NUMBER 1 - Continued  
 (b)  $\theta = -5^\circ$  or  $\delta = -1.86^\circ$

M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$	M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$
0.70	-6.2	-0.341	0.0484	0.0552	1.30	-5.9	-0.315	0.0489	0.0823
	-4.2	-.233	.0279	.0399		-3.9	-.221	.0312	.0579
	-2.3	-.137	.0168	.0251		-1.9	-.125	.0198	.0334
	-.2	-.036	.0106	.0095		-.3	-.046	.0151	.0128
	.3	-.013	.0102	.0057		.1	-.022	.0143	.0069
	1.8	.062	.0101	-.0058		.6	-.001	.0142	.0015
	3.8	.148	.0133	-.0188		2.0	.067	.0150	-.0167
	5.7	.240	.0192	-.0325		4.0	.161	.0202	-.0405
	7.8	.361	.0429	-.0506		5.8	.251	.0307	-.0641
	9.9	.478	.0736	-.0674		8.2	.367	.0553	-.0932
	11.8	.583	.1098	-.0804		10.2	.465	.0841	-.1172
	13.9	.706	.1589	-.0973		12.0	.552	.1167	-.1386
	15.8	.816	.2130	-.1122		14.1	.643	.1589	-.1616
	17.9	.928	.2780	-.1236		16.0	.726	.2042	-.1823
0.90	-5.8	-.363	.0507	.0747	1.70	-6.1	-.253	.0424	.0643
	-3.9	-.244	.0294	.0495		-4.1	-.182	.0281	.0469
	-2.0	-.136	.0167	.0289		-2.1	-.106	.0187	.0282
	-.4	-.051	.0114	.0124		-.6	-.048	.0146	.0139
	.1	-.027	.0107	.0080		-.1	-.028	.0141	.0086
	.6	.003	.0102	.0028		.5	-.005	.0136	.0030
	2.1	.076	.0108	-.0110		1.9	.052	.0141	-.0115
	4.2	.182	.0156	-.0293		3.8	.127	.0190	-.0305
	5.9	.278	.0260	-.0478		5.8	.205	.0289	-.0494
	8.0	.406	.0525	-.0726		7.8	.281	.0441	-.0680
	10.1	.560	.0937	-.1105		9.8	.351	.0646	-.0843
	12.1	.682	.1390	-.1358		11.9	.424	.0916	-.1011
	14.1	.811	.1945	-.1709		13.8	.488	.1204	-.1159
	16.2	.942	.2638	-.2055		15.9	.558	.1586	-.1306
1.00	-5.8	-.384	.0582	.1001	2.22	-5.7	-.184	.0322	.0424
	-3.8	-.264	.0366	.0702		-3.6	-.124	.0212	.0291
	-1.8	-.139	.0223	.0390		-1.7	-.067	.0147	.0165
	.3	-.018	.0151	.0075		-.2	-.021	.0125	.0059
	.9	.011	.0140	-.0005		.3	-.006	.0121	.0027
	2.3	.096	.0165	-.0211		.8	.010	.0119	-.0016
	4.2	.208	.0229	-.0504		2.3	.059	.0135	-.0123
	6.2	.326	.0382	-.0809		4.3	.120	.0191	-.0264
	8.2	.446	.0635	-.1113		6.3	.180	.0281	-.0397
	10.2	.576	.1033	-.1425		8.3	.238	.0413	-.0518
	12.3	.696	.1502	-.1709		10.4	.290	.0583	-.0623
	14.4	.804	.2031	-.1956		12.4	.347	.0808	-.0733
	16.3	.903	.2604	-.2197		14.3	.399	.1040	-.0819
	18.4	.995	.3264	-.2441		16.3	.452	.1344	-.0906
						18.4	.505	.1687	-.0999

TABLE II.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH  
 FLAP NUMBER 1 - Continued  
 (c)  $\theta = -10^\circ$  or  $\delta = -3.7^\circ$

M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$	M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$
0.70	-6.3	-0.367	0.0593	0.0585	1.30	-6.0	-0.331	0.0571	0.0875
	-4.3	-.258	.0377	.0430		-4.0	-.234	.0369	.0624
	-2.2	-.155	.0222	.0283		-1.9	-.134	.0237	.0370
	-.7	-.078	.0150	.0166		-.4	-.062	.0177	.0181
	-.2	-.050	.0128	.0126		.1	-.037	.0165	.0117
	.3	-.025	.0120	.0086		.6	-.017	.0160	.0063
	1.9	.046	.0109	-.0025		2.0	.053	.0154	-.0117
	3.8	.134	.0126	-.0162		4.0	.151	.0196	-.0373
	5.8	.222	.0180	-.0282		6.1	.250	.0299	-.0618
	7.8	.320	.0305	-.0431		8.0	.350	.0465	-.0878
	9.8	.440	.0594	-.0598		10.0	.446	.0724	-.1108
	11.8	.555	.0953	-.0743		12.1	.548	.1092	-.1364
	13.8	.674	.1414	-.0897		13.9	.639	.1485	-.1596
	15.8	.786	.1949	-.1031		16.1	.733	.1988	-.1820
	17.8	.900	.2572	-.1166		18.0	.810	.2489	-.1983
0.90	-6.0	-.382	.0604	.0751	1.70	-6.1	-.263	.0485	.0666
	-4.0	-.275	.0393	.0566		-4.2	-.194	.0334	.0499
	-1.9	-.149	.0210	.0315		-2.2	-.118	.0227	.0313
	-.3	-.068	.0144	.0166		-.6	-.062	.0176	.0175
	.1	-.044	.0128	.0122		-.1	-.042	.0163	.0124
	.6	-.018	.0118	.0072		.4	-.022	.0156	.0076
	1.9	.050	.0107	-.0045		1.8	.034	.0150	-.0064
	4.1	.159	.0142	-.0245		3.8	.111	.0184	-.0255
	6.1	.257	.0217	-.0403		5.8	.190	.0267	-.0453
	8.0	.365	.0390	-.0601		7.9	.268	.0407	-.0641
	10.0	.495	.0721	-.0858		9.9	.343	.0604	-.0818
	12.1	.642	.1203	-.1180		11.8	.414	.0849	-.0978
	14.0	.759	.1694	-.1439		13.7	.481	.1133	-.1129
	16.0	.906	.2389	-.1830		15.8	.553	.1507	-.1278
						17.8	.616	.1900	-.1392
1.00	-5.8	-.400	.0666	.1032	2.22	-5.7	-.193	.0368	.0441
	-3.7	-.282	.0410	.0749		-3.7	-.139	.0260	.0324
	-1.8	-.162	.0261	.0456		-1.7	-.079	.0179	.0192
	.3	-.044	.0150	.0165		-.2	-.036	.0145	.0096
	.7	-.014	.0154	.0086		.3	-.019	.0140	.0058
	2.2	.074	.0154	-.0144		.8	-.004	.0131	.0025
	4.2	.188	.0201	-.0430		2.3	.042	.0137	-.0078
	6.1	.306	.0326	-.0726		4.3	.104	.0181	-.0218
	8.2	.430	.0529	-.1038		6.2	.163	.0258	-.0351
	10.0	.554	.0875	-.1331		8.3	.224	.0387	-.0480
	12.3	.684	.1377	-.1652		10.2	.281	.0543	-.0595
	14.1	.795	.1884	-.1911		12.3	.341	.0752	-.0708
	16.3	.904	.2501	-.2159		14.2	.394	.0990	-.0798
	18.3	1.006	.3171	-.2404		16.3	.451	.1302	-.0890
						18.3	.506	.1634	-.0980

TABLE II.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH  
 FLAP NUMBER 1 - Concluded  
 (d)  $\theta = -15^\circ$  or  $\delta = -5.58^\circ$

M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$	M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$
0.70	-6.2	-0.398	0.0658	0.0696	1.30	-6.0	-0.333	0.0597	0.0879
	-4.1	-.276	.0411	.0492		-3.9	-.241	.0398	.0647
	-2.2	-.171	.0255	.0338		-2.0	-.145	.0264	.0409
	-.7	-.091	.0166	.0216		-.5	-.077	.0201	.0234
	-.2	-.065	.0148	.0174		0	-.050	.0181	.0162
	.2	-.045	.0136	.0142		.5	-.028	.0172	.0107
	1.8	.042	.0115	-.0010		2.0	.046	.0157	-.0081
	3.8	.135	.0136	-.0149		4.1	.151	.0198	-.0359
	5.8	.224	.0182	-.0284		5.9	.237	.0283	-.0581
	7.8	.313	.0277	-.0413		8.1	.341	.0452	-.0851
	9.8	.418	.0502	-.0562		10.1	.440	.0684	-.1099
	11.8	.546	.0880	-.0751		12.0	.528	.1004	-.1308
	13.8	.645	.1290	-.0826		14.0	.622	.1422	-.1545
	15.8	.779	.1872	-.1068		16.0	.712	.1882	-.1772
	17.8	.878	.2444	-.1141		18.1	.796	.2398	-.1973
0.90	-5.9	-.417	.0683	.0927	1.70	-6.2	-.270	.0516	.0691
	-3.9	-.293	.0425	.0640		-4.0	-.195	.0348	.0509
	-2.0	-.183	.0263	.0425		-2.2	-.124	.0245	.0333
	-.4	-.084	.0164	.0230		-.6	-.064	.0189	.0189
	.1	-.058	.0145	.0176		-.1	-.045	.0177	.0139
	.5	-.033	.0132	.0134		.3	-.030	.0169	.0101
	2.1	.056	.0120	-.0049		1.9	.032	.0159	-.0054
	4.1	.161	.0148	-.0243		3.9	.112	.0190	-.0249
	6.0	.260	.0218	-.0421		5.8	.186	.0266	-.0440
	8.0	.372	.0372	-.0635		7.9	.260	.0397	-.0621
	10.0	.495	.0673	-.0880		9.8	.333	.0580	-.0793
	12.0	.637	.1141	-.1227		11.9	.406	.0822	-.0966
	14.0	.773	.1690	-.1593		13.9	.476	.1112	-.1119
	16.1	.894	.2310	-.1872		15.9	.543	.1455	-.1261
	18.1	.982	.2921	-.2039		17.9	.610	.1852	-.1384
1.00	-5.7	-.412	.0708	.1094	2.22	-5.7	-.197	.0387	.0460
	-3.6	-.288	.0438	.0789		-3.7	-.141	.0271	.0341
	-1.7	-.170	.0293	.0497		-1.7	-.086	.0191	.0221
	-.2	-.080	.0209	.0270		-.2	-.040	.0156	.0115
	.7	-.030	.0177	.0142		.3	-.024	.0151	.0082
	2.3	.075	.0187	-.0146		.8	-.009	.0146	.0048
	6.2	.294	.0343	-.0713		2.2	.038	.0148	-.0055
	8.2	.419	.0534	-.1038		4.3	.100	.0184	-.0193
	10.2	.539	.0830	-.1338		6.2	.159	.0259	-.0329
	12.2	.664	.1286	-.1626		8.2	.219	.0379	-.0460
	14.2	.774	.1788	-.1873		10.3	.277	.0532	-.0577
	16.3	.879	.2375	-.2115		12.3	.334	.0732	-.0687
	18.3	.974	.2998	-.2340		14.2	.388	.0963	-.0779
						16.3	.443	.1256	-.0874
						18.3	.495	.1583	-.0964

TABLE III.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH  
 FLAP NUMBER 2  
 (a)  $\theta = 0^\circ$  or  $\delta = 0^\circ$

M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$	M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$
0.70	-6.2	-0.346	0.0492	0.0555	1.30	-6.0	-0.314	0.0492	0.0815
	-4.1	-.235	.0292	.0388		-3.9	-.214	.0311	.0558
	-2.2	-.138	.0179	.0248		-2.0	-.123	.0205	.0325
	-.7	-.061	.0127	.0132		-.5	-.049	.0159	.0133
	-.2	-.037	.0120	.0093		0	-.024	.0152	.0070
	.3	-.018	.0114	.0060		.5	.002	.0148	.0008
	1.8	.060	.0109	-.0058		2.0	.074	.0155	-.0181
	3.8	.154	.0140	-.0200		4.0	.173	.0219	-.0439
	5.7	.241	.0196	-.0329		6.0	.266	.0338	-.0679
	7.8	.351	.0397	-.0508		8.0	.366	.0540	-.0934
	9.8	.471	.0736	-.0669		10.0	.460	.0819	-.1166
	11.8	.587	.1128	-.0817		12.1	.556	.1184	-.1405
	13.7	.700	.1578	-.0977		14.0	.642	.1578	-.1623
	15.7	.810	.2121	-.1108		16.1	.731	.2064	-.1849
	17.8	.932	.2803	-.1269		18.0	.812	.2584	-.2037
0.90	-5.9	-.370	.0519	.0752	1.70	-6.1	-.250	.0427	.0623
	-3.9	-.244	.0294	.0495		-4.1	-.177	.0285	.0445
	-2.0	-.137	.0177	.0288		-2.2	-.106	.0197	.0274
	-.5	-.055	.0124	.0134		-.7	-.048	.0156	.0131
	.1	-.026	.0117	.0078		-.2	-.029	.0147	.0082
	.5	-.001	.0110	.0039		.3	-.009	.0145	.0033
	2.0	.079	.0117	-.0115		1.8	.052	.0153	-.0117
	4.1	.180	.0156	-.0297		3.9	.134	.0206	-.0323
	6.0	.279	.0238	-.0474		5.8	.207	.0308	-.0503
	8.1	.412	.0530	-.0763		7.9	.283	.0464	-.0684
	10.0	.553	.0927	-.1088		9.8	.352	.0660	-.0849
	12.1	.688	.1418	-.1395		11.8	.423	.0917	-.1016
	14.0	.805	.1926	-.1697		13.8	.489	.1218	-.1167
	16.0	.931	.2583	-.2035		15.8	.554	.1566	-.1305
						17.8	.617	.1970	-.1425
1.00	-5.7	-.377	.0553	.0972	2.22	-5.7	-.188	.0330	.0426
	-3.7	-.249	.0351	.0657		-3.7	-.129	.0223	.0294
	-1.8	-.136	.0211	.0373		-1.7	-.070	.0158	.0165
	-.2	-.047	.0187	.0144		-.2	-.023	.0132	.0058
	.2	-.023	.0154	.0084		.3	-.008	.0129	.0023
	.7	.015	.0188	-.0012		.8	.010	.0130	-.0019
	2.2	.098	.0182	-.0230		2.3	.056	.0144	-.0123
	4.2	.211	.0227	-.0511		4.3	.119	.0194	-.0264
	6.2	.326	.0384	-.0821		6.3	.175	.0289	-.0388
	8.2	.455	.0664	-.1145		8.3	.236	.0423	-.0519
	10.2	.577	.1037	-.1444		10.2	.289	.0586	-.0628
	12.3	.701	.1525	-.1729		12.3	.344	.0798	-.0734
	14.2	.802	.2008	-.1966		14.3	.399	.1052	-.0827
	16.2	.906	.2609	-.2225		16.2	.449	.1335	-.0908
	18.2	.999	.3251	-.2444		18.3	.503	.1686	-.1001

TABLE III.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH  
 FLAP NUMBER 2 - Continued  
 (b)  $\theta = -5^\circ$  or  $\delta = -1.86^\circ$

M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$	M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$
0.70	-6.2	-0.359	0.0552	0.0583	1.30	-6.0	-0.322	0.0535	0.0842
	-4.1	-.249	.0341	.0424		-3.9	-.226	.0348	.0598
	-2.2	-.149	.0205	.0277		-2.0	-.131	.0228	.0363
	-.7	-.071	.0144	.0157		-.4	-.056	.0174	.0168
	-.1	-.045	.0132	.0117		0	-.036	.0160	.0116
	.3	-.024	.0124	.0087		.5	-.012	.0158	.0051
	1.8	.050	.0115	-.0032		2.0	.062	.0159	-.0139
	3.8	.144	.0137	-.0179		4.0	.162	.0207	-.0405
	5.7	.232	.0190	-.0307		6.0	.257	.0317	-.0645
	7.8	.327	.0305	-.0442		8.0	.352	.0496	-.0889
	9.8	.449	.0631	-.0629		10.0	.447	.0760	-.1122
	11.9	.570	.1038	-.0771		12.1	.545	.1112	-.1361
	13.7	.685	.1477	-.0944		14.0	.633	.1509	-.1579
	15.8	.796	.2025	-.1062		16.0	.723	.1983	-.1802
	17.8	.912	.2655	-.1206		18.0	.803	.2484	-.1989
0.90	-6.0	-.385	.0586	.0805	1.70	-6.1	-.261	.0464	.0653
	-3.9	-.264	.0351	.0563		-4.1	-.188	.0317	.0478
	-1.9	-.149	.0205	.0324		-2.2	-.116	.0219	.0303
	-.4	-.063	.0141	.0162		-.7	-.059	.0168	.0160
	.2	-.036	.0128	.0113		-.1	-.036	.0161	.0105
	.5	-.013	.0121	.0069		.4	-.018	.0155	.0058
	2.0	.064	.0115	-.0079		1.8	.043	.0156	-.0091
	4.1	.170	.0151	-.0273		3.9	.122	.0198	-.0292
	6.1	.275	.0232	-.0459		5.8	.197	.0283	-.0475
	8.1	.386	.0422	-.0669		7.8	.270	.0431	-.0651
	10.0	.532	.0830	-.1038		9.8	.338	.0619	-.0812
	12.1	.672	.1311	-.1379		11.9	.413	.0872	-.0980
	14.0	.790	.1825	-.1639		13.8	.479	.1167	-.1129
	16.0	.923	.2494	-.2032		15.9	.548	.1523	-.1274
						17.8	.611	.1910	-.1386
1.00	-5.7	-.383	.0621	.1001	2.22	-5.6	-.189	.0353	.0434
	-3.7	-.263	.0387	.0707		-3.6	-.131	.0243	.0306
	-1.7	-.146	.0251	.0413		-1.7	-.076	.0169	.0183
	-.2	-.057	.0174	.0184		-.3	-.031	.0143	.0085
	.8	.002	.0186	.0028		.3	-.013	.0139	.0043
	2.3	.086	.0159	-.0187		.8	.001	.0136	.0010
	4.3	.202	.0248	-.0494		2.3	.050	.0146	-.0099
	6.2	.314	.0352	-.0779		4.3	.114	.0195	-.0243
	8.2	.437	.0573	-.1097		6.2	.170	.0279	-.0367
	10.2	.562	.0951	-.1392		8.3	.228	.0407	-.0490
	12.2	.683	.1415	-.1679		10.3	.285	.0577	-.0605
	14.2	.789	.1912	-.1924		12.3	.342	.0777	-.0708
	16.2	.894	.2504	-.2161		14.3	.394	.1015	-.0794
	18.2	.989	.3151	-.2385		16.3	.449	.1311	-.0881
						18.3	.501	.1640	-.0966

TABLE III.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH  
 FLAP NUMBER 2 - Continued  
 (c)  $\theta = -10^\circ$  or  $\delta = -3.72^\circ$

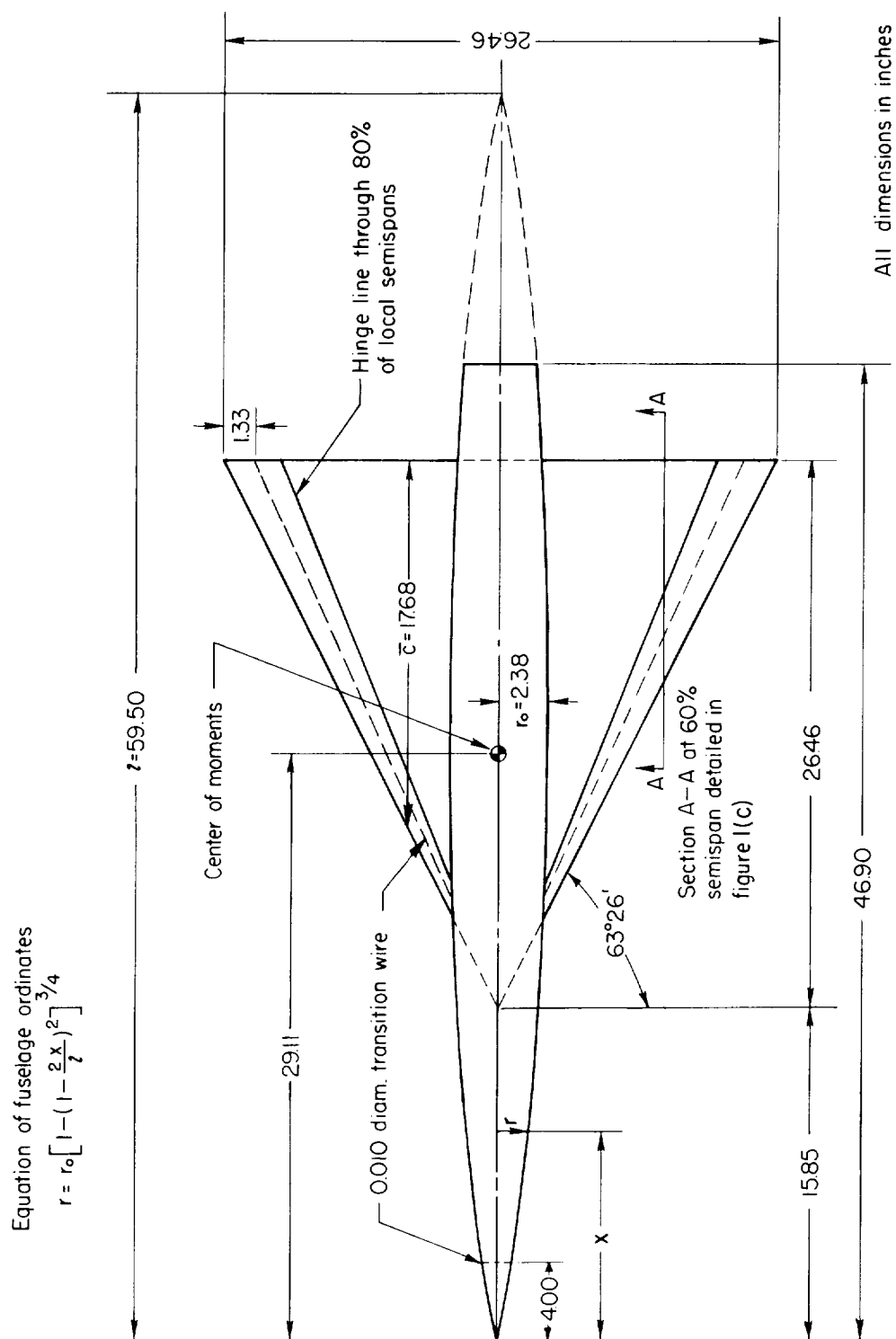
M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$	M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$
0.70	-6.2	-0.370	0.0613	0.0595	1.30	-6.0	-0.330	0.0590	0.0869
	-4.2	-.269	.0405	.0454		-3.9	-.237	.0394	.0634
	-2.2	-.163	.0248	.0300		-2.1	-.147	.0268	.0403
	-.7	-.085	.0171	.0186		-.5	-.072	.0201	.0209
	-.1	-.056	.0151	.0143		0	-.048	.0186	.0151
	.4	-.034	.0140	.0111		.7	-.017	.0166	.0077
	1.9	.039	.0121	-.0005		2.1	.055	.0167	-.0116
	3.8	.129	.0132	-.0144		4.0	.145	.0201	-.0351
	5.6	.212	.0171	-.0262		6.0	.241	.0296	-.0601
	7.8	.310	.0266	-.0394		8.0	.338	.0453	-.0849
	9.8	.412	.0478	-.0548		9.8	.437	.0682	-.1089
	11.8	.533	.0871	-.0710		12.1	.533	.1040	-.1322
	13.8	.641	.1303	-.0802		13.9	.614	.1393	-.1523
	15.8	.765	.1845	-.0996		16.2	.716	.1926	-.1778
	17.8	.870	.2425	-.1098		18.3	.806	.2484	-.1992
0.90	-5.9	-.397	.0644	.0800	1.70	-6.1	-.262	.0501	.0661
	-3.9	-.282	.0409	.0571		-4.0	-.189	.0345	.0484
	-2.1	-.173	.0253	.0376		-2.2	-.119	.0242	.0314
	-.5	-.083	.0168	.0207		-.6	-.062	.0191	.0175
	.1	-.055	.0151	.0158		-.1	-.041	.0180	.0123
	.6	-.025	.0134	.0103		.5	-.020	.0170	.0069
	2.1	.056	.0124	-.0046		2.1	.041	.0164	-.0078
	4.1	.156	.0144	-.0226		3.8	.110	.0195	-.0252
	6.0	.247	.0206	-.0386		5.7	.187	.0275	-.0439
	8.1	.354	.0326	-.0553		7.9	.267	.0416	-.0631
	10.1	.471	.0628	-.0779		9.8	.336	.0598	-.0792
	12.0	.612	.1099	-.1077		11.8	.404	.0826	-.0947
	14.0	.740	.1617	-.1341		13.8	.472	.1107	-.1097
	16.1	.874	.2254	-.1674		15.8	.538	.1443	-.1237
						17.8	.604	.1837	-.1357
1.00	-5.7	-.401	.0693	.1060	2.22	-5.7	-.192	.0383	.0438
	-3.7	-.289	.0455	.0780		-3.7	-.137	.0271	.0323
	-1.8	-.169	.0306	.0481		-1.8	-.082	.0195	.0199
	-.2	-.079	.0206	.0254		-.2	-.035	.0160	.0096
	.4	-.040	.0196	.0156		.3	-.020	.0154	.0064
	.8	-.014	.0180	.0092		.7	-.009	.0147	.0036
	2.4	.081	.0181	-.0165		2.4	.043	.0154	-.0078
	4.3	.193	.0234	-.0460		4.4	.106	.0188	-.0217
	6.1	.296	.0326	-.0725		6.3	.163	.0270	-.0346
	8.2	.420	.0522	-.1034		8.2	.220	.0386	-.0462
	10.3	.540	.0839	-.1326		10.4	.278	.0551	-.0583
	12.2	.658	.1280	-.1602		12.2	.331	.0733	-.0683
	14.2	.772	.1795	-.1873		14.3	.387	.0976	-.0772
	16.3	.883	.2412	-.2125		16.3	.440	.1257	-.0856
	18.2	.973	.3005	-.2337		18.2	.493	.1571	-.0942

TABLE III.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH  
 FLAP NUMBER 2 - Concluded  
 (d)  $\theta = -15^\circ$  or  $\delta = -5.58^\circ$

M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$	M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$
0.70	-6.2	-0.386	0.0679	0.0636	1.30	-5.9	-0.333	0.0622	0.0878
	-4.2	-.281	.0455	.0483		-3.9	-.240	.0424	.0640
	-2.2	-.173	.0287	.0323		-2.1	-.155	.0294	.0427
	-.7	-.100	.0204	.0214		-.4	-.075	.0219	.0220
	-.2	-.071	.0183	.0171		.1	-.050	.0205	.0155
	.3	-.047	.0164	.0135		.5	-.031	.0194	.0108
	1.9	.026	.0133	.0022		2.1	.043	.0174	-.0080
	3.8	.116	.0141	-.0118		4.0	.138	.0209	-.0325
	5.7	.205	.0174	-.0252		6.0	.230	.0289	-.0568
	7.8	.295	.0258	-.0375		8.0	.330	.0441	-.0820
	9.8	.387	.0398	-.0504		10.0	.421	.0659	-.1042
	11.9	.515	.0786	-.0695		12.0	.514	.0964	-.1266
	13.8	.626	.1217	-.0819		14.0	.604	.1346	-.1487
	15.8	.733	.1718	-.0921		16.1	.696	.1809	-.1715
	17.8	.868	.2365	-.1158		18.0	.779	.2302	-.1915
0.90	-5.9	-.411	.0710	.0893	1.70	-6.1	-.264	.0526	.0670
	-1.8	-.179	.0285	.0403		-4.1	-.198	.0377	.0510
	-.4	-.094	.0202	.0238		-2.3	-.130	.0270	.0345
	.1	-.065	.0179	.0186		-.6	-.070	.0213	.0195
	.7	-.035	.0164	.0132		-.2	-.055	.0199	.0159
	4.1	.144	.0151	-.0205		.3	-.036	.0190	.0112
	6.1	.233	.0203	-.0372		1.9	.021	.0176	-.0032
	8.1	.349	.0325	-.0569		3.8	.098	.0201	-.0216
	10.0	.453	.0535	-.0754		5.9	.175	.0275	-.0411
	12.0	.604	.1030	-.1146		8.2	.260	.0419	-.0618
	14.0	.748	.1594	-.1530		9.9	.324	.0574	-.0769
	16.1	.870	.2212	-.1797		11.8	.390	.0789	-.0925
	18.1	.992	.2908	-.2147		13.8	.457	.1054	-.1068
						15.9	.530	.1408	-.1221
						17.9	.595	.1792	-.1338
1.00	-5.7	-.404	.0734	.1061	2.22	-5.6	-.189	.0395	.0440
	-3.7	-.288	.0487	.0778		-3.7	-.135	.0284	.0321
	-1.7	-.174	.0330	.0495		-1.7	-.081	.0210	.0199
	-.2	-.091	.0239	.0294		-.1	-.036	.0175	.0104
	.3	-.059	.0227	.0201		.3	-.025	.0169	.0075
	.8	-.028	.0213	.0119		.8	-.009	.0164	.0042
	2.3	.055	.0196	-.0098		2.3	.037	.0166	-.0063
	4.3	.172	.0233	-.0400		4.3	.096	.0198	-.0194
	6.2	.281	.0336	-.0692		6.3	.155	.0270	-.0326
	8.2	.395	.0471	-.0968		8.3	.214	.0387	-.0449
	10.3	.517	.0754	-.1263		10.3	.268	.0525	-.0557
	12.2	.639	.1185	-.1555		12.3	.322	.0712	-.0662
	14.2	.754	.1620	-.1828		14.4	.380	.0951	-.0756
	16.2	.857	.2274	-.2059		16.3	.434	.1226	-.0839
	18.2	.953	.2878	-.2279		18.3	.485	.1540	-.0925

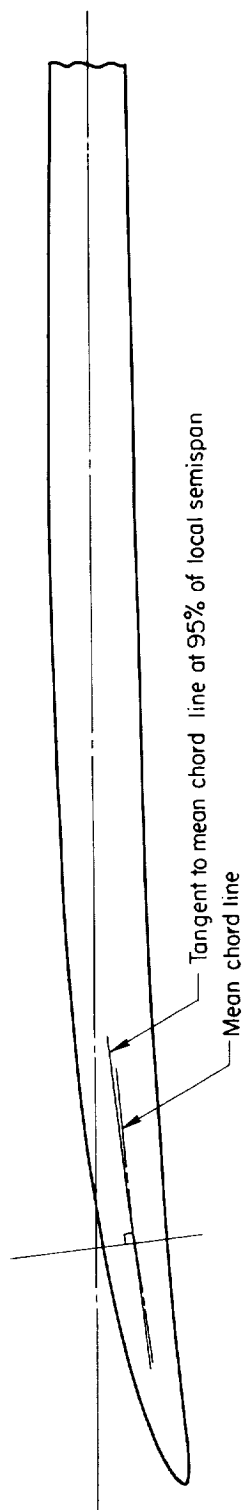
TABLE IV.- AERODYNAMIC CHARACTERISTICS OF THE CONFIGURATION WITH  
 FLAP NUMBER 3  
 $\theta = -15^\circ$  or  $\delta = -5.58^\circ$

M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$	M	$\alpha$ , deg	$C_L$	$C_D$	$C_m$
0.70	-6.3	-0.384	0.0695	0.0631	1.30	-6.0	-0.337	0.0655	0.0894
	-4.1	-.278	.0469	.0482		-3.9	-.245	.0449	.0659
	-2.2	-.178	.0310	.0335		-1.9	-.154	.0308	.0430
	-.7	-.099	.0214	.0221		-.4	-.081	.0235	.0243
	-.2	-.074	.0200	.0184		.1	-.057	.0222	.0181
	.3	-.051	.0185	.0149		.5	-.038	.0211	.0131
	1.8	.021	.0148	.0035		2.0	.032	.0187	-.0050
	3.8	.118	.0145	-.0111		4.0	.132	.0210	-.0307
	5.8	.211	.0184	-.0252		6.0	.228	.0292	-.0558
	7.7	.298	.0255	-.0379		8.0	.327	.0440	-.0815
	9.8	.386	.0375	-.0493		10.0	.421	.0665	-.1043
	11.8	.483	.0603	-.0632		12.0	.513	.0971	-.1264
	13.8	.625	.1179	-.0852		14.0	.602	.1321	-.1482
	15.8	.736	.1678	-.0987		16.0	.696	.1775	-.1718
	17.8	.883	.2372	-.1206		18.1	.782	.2290	-.1927
0.90	-5.9	-.410	.0724	.0877	1.70	-6.1	-.268	.0556	.0684
	-3.9	-.302	.0492	.0651		-4.2	-.201	.0401	.0521
	-2.0	-.182	.0306	.0411		-2.2	-.130	.0285	.0347
	-.4	-.095	.0215	.0247		-.7	-.073	.0227	.0210
	.1	-.069	.0193	.0197		-.2	-.055	.0212	.0165
	.6	-.045	.0179	.0151		.3	-.036	.0203	.0118
	2.0	.035	.0147	-.0002		1.8	.021	.0186	-.0026
	4.1	.141	.0154	-.0191		3.9	.099	.0208	-.0213
	6.0	.242	.0210	-.0373		5.8	.175	.0279	-.0404
	8.0	.340	.0315	-.0538		7.9	.253	.0405	-.0591
	10.0	.454	.0525	-.0743		9.9	.324	.0579	-.0761
	12.1	.584	.0944	-.1053		11.9	.395	.0804	-.0923
	14.0	.737	.1526	-.1477		13.8	.462	.1067	-.1073
	16.1	.866	.2155	-.1801		15.8	.531	.1400	-.1217
	18.1	.990	.2858	-.2158		17.8	.594	.1770	-.1333
1.00	-5.8	-.408	.0769	.1072	2.22	-5.7	-.198	.0428	.0459
	-3.7	-.297	.0516	.0800		-4.1	-.144	.0316	.0346
	-1.7	-.182	.0339	.0519		-1.7	-.087	.0229	.0221
	-.3	-.091	.0265	.0297		-.3	-.045	.0190	.0128
	.2	-.068	.0225	.0240		.3	-.030	.0184	.0095
	.8	-.034	.0225	.0150		.7	-.018	.0178	.0065
	2.2	.049	.0200	-.0067		2.3	.031	.0175	-.0045
	4.2	.169	.0237	-.0379		4.3	.092	.0207	-.0180
	6.2	.281	.0317	-.0660		6.3	.150	.0276	-.0308
	8.2	.401	.0493	-.0975		8.3	.209	.0384	-.0434
	10.2	.516	.0733	-.1246		10.3	.267	.0533	-.0552
	12.3	.634	.1152	-.1518		12.3	.326	.0727	-.0668
	14.2	.741	.1615	-.1777		14.3	.380	.0950	-.0758
	16.3	.854	.2224	-.2040		16.3	.436	.1235	-.0851
	18.3	.956	.2849	-.2272		18.3	.488	.1546	-.0935

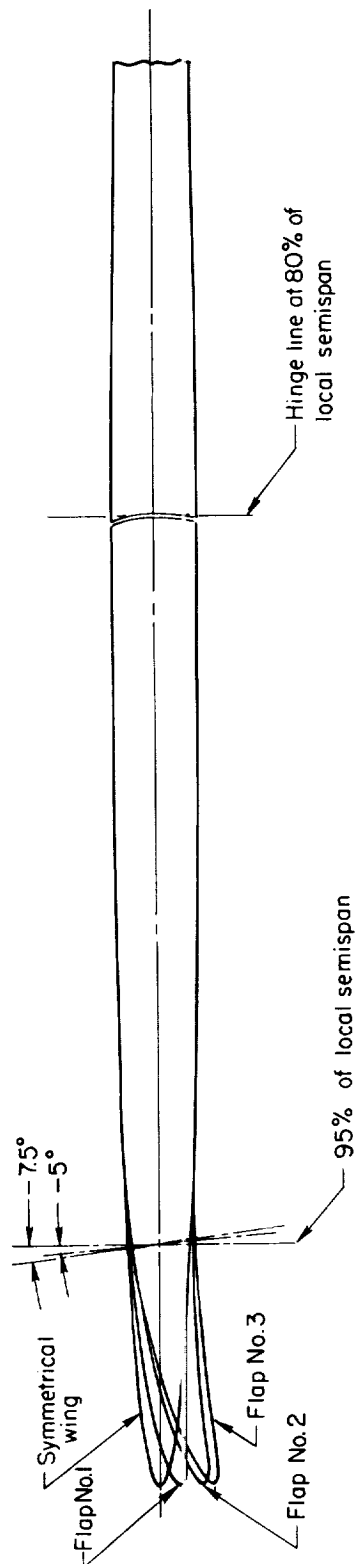


(a) Dimensional sketch of model.

Figure 1.- Model details and dimensions.

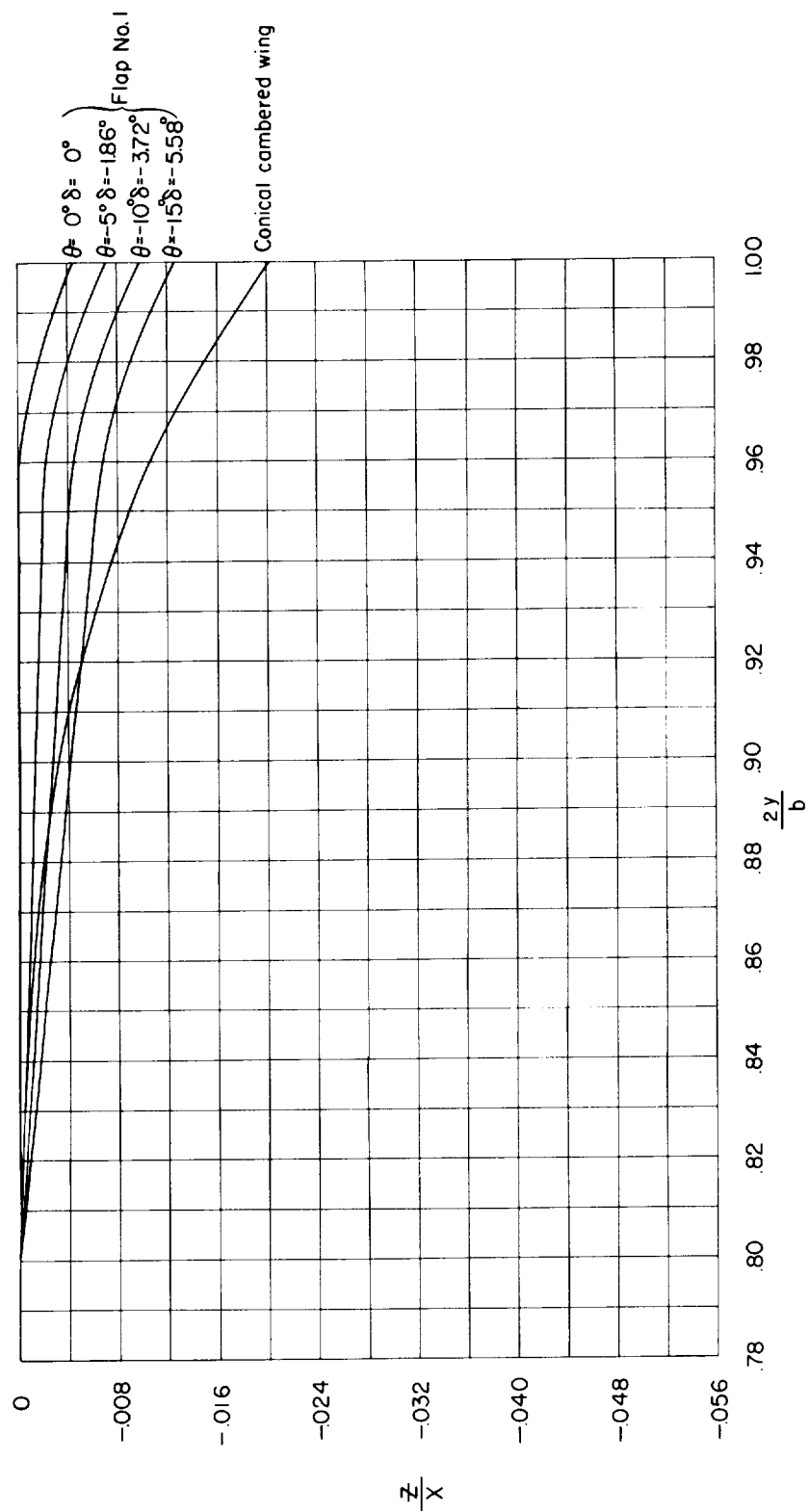


(b) Section at 60 percent of semispan of conical cambered wing;  $C_{L_d} = 0.215$  at  $M = 1.0$ .



(c) Details of section A-A of figure 1(a).

Figure 1.- Continued.



(d) Ordinates of mean camber lines for several flap deflections compared with those of fully cambered wing.

Figure 1.- Concluded.

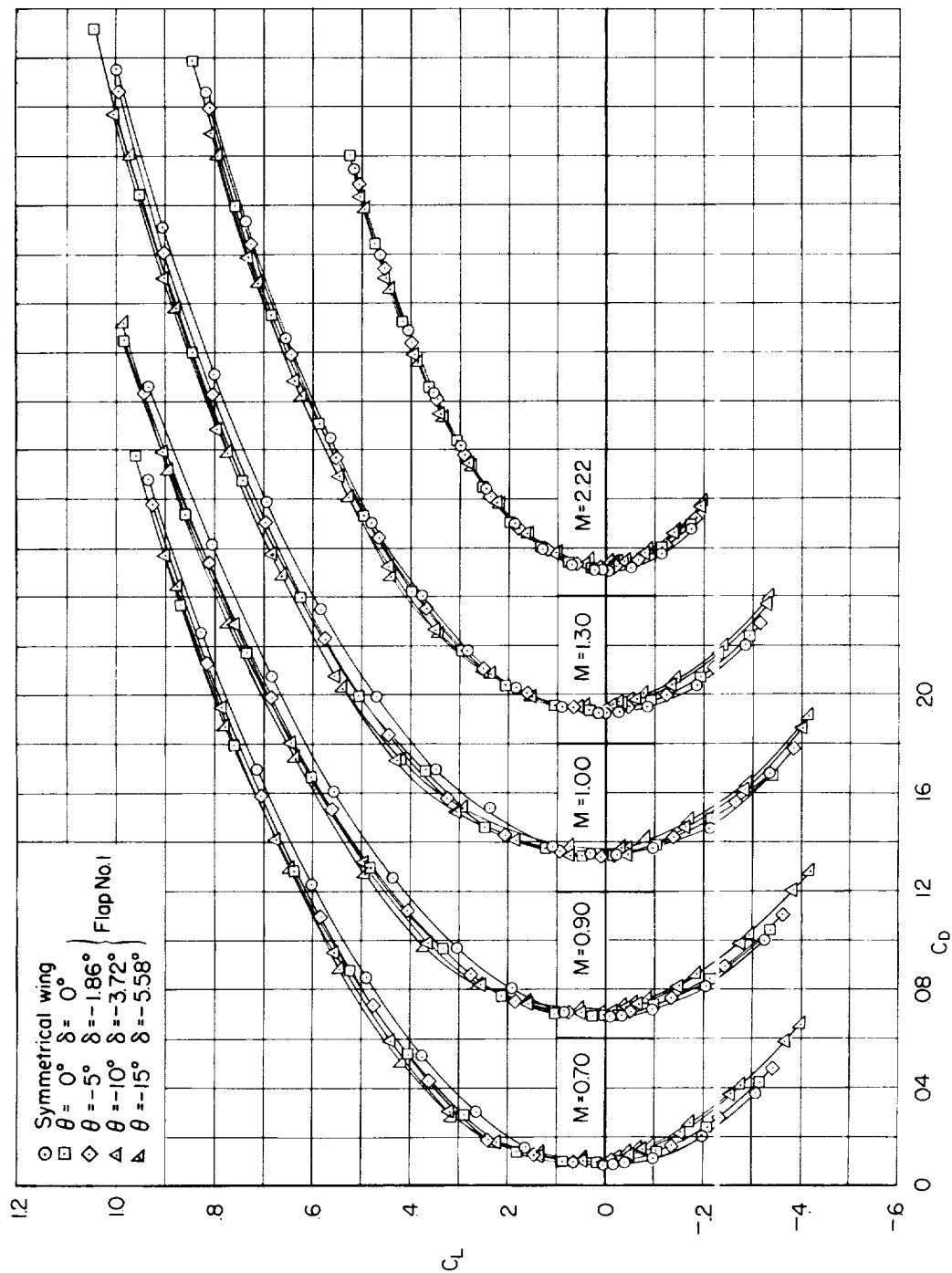


Figure 2.- Variation of drag coefficient with lift coefficient for several flap deflections.

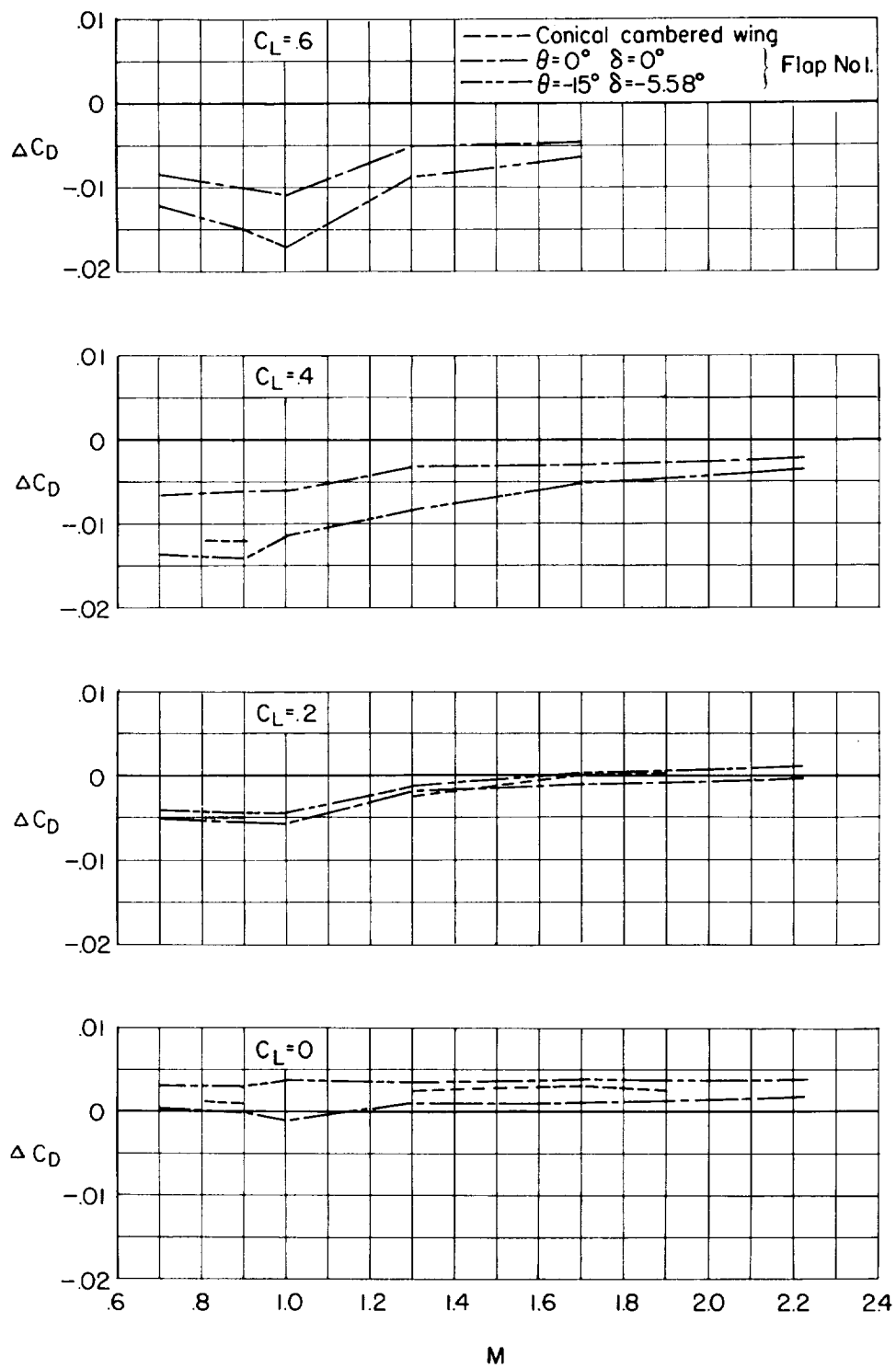


Figure 3.- Variation of drag coefficient increment with Mach number.

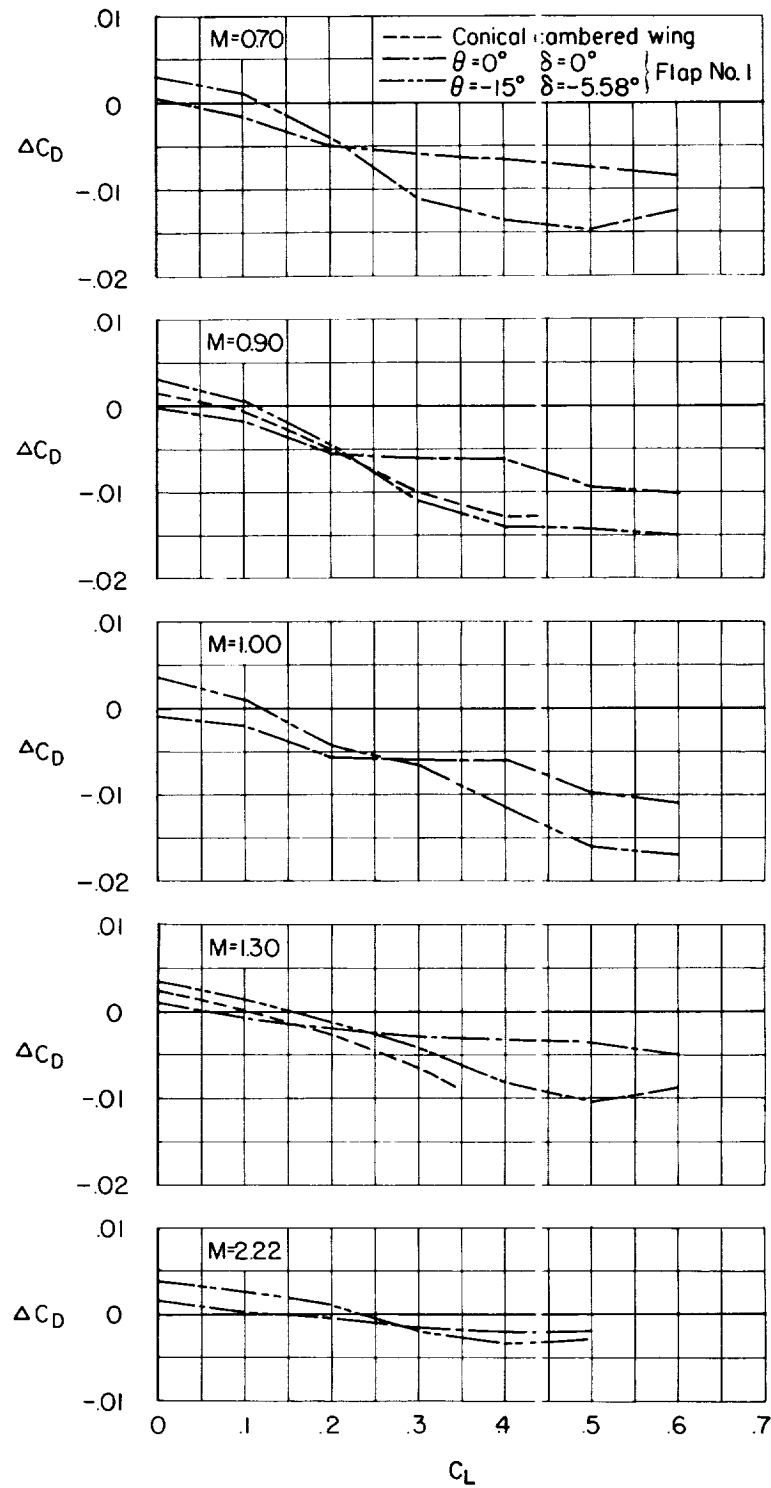


Figure 4.- Variation of drag coefficient increment with lift coefficient.

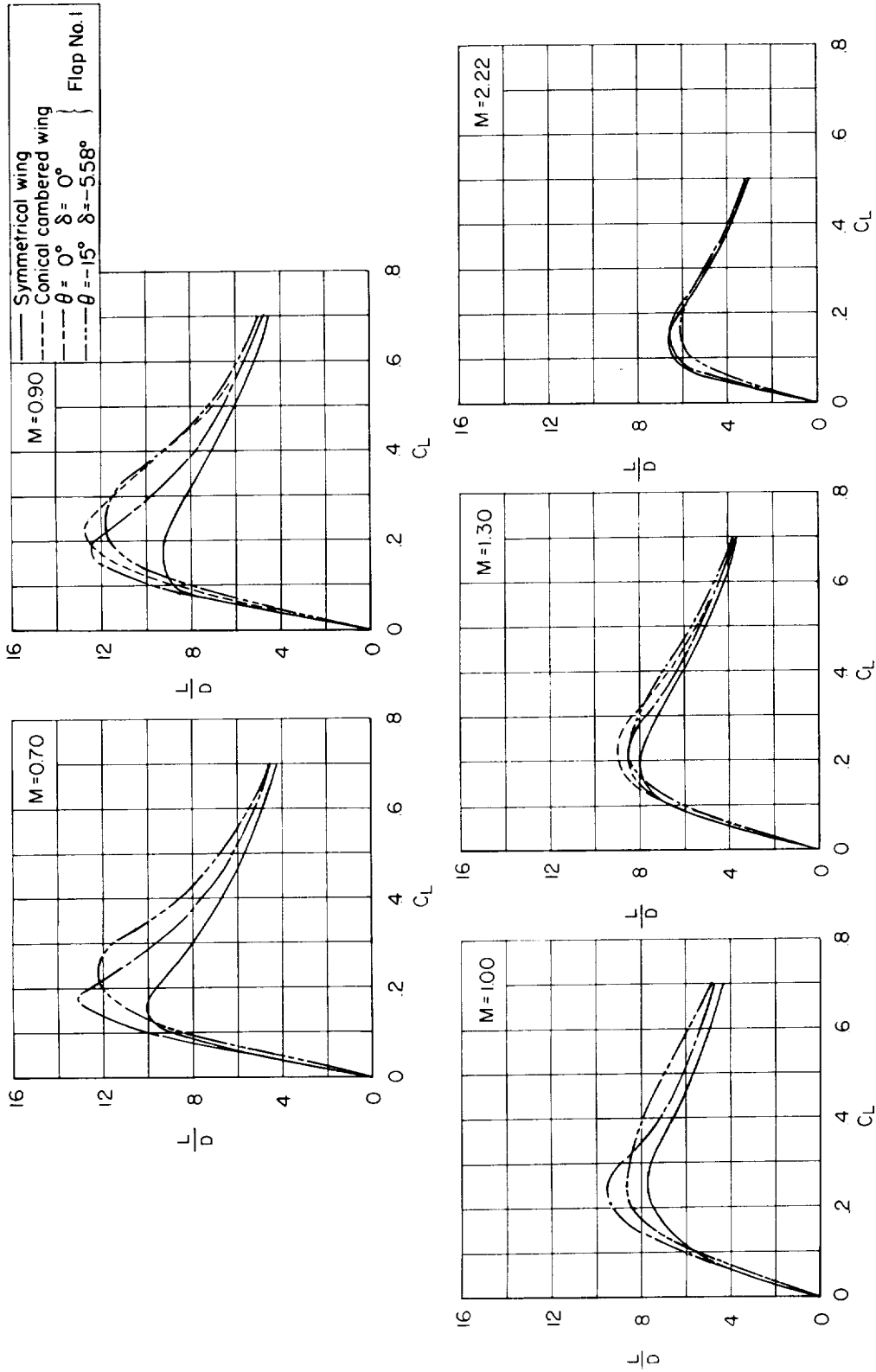


Figure 5.- Variation of lift-drag ratio with lift coefficient.

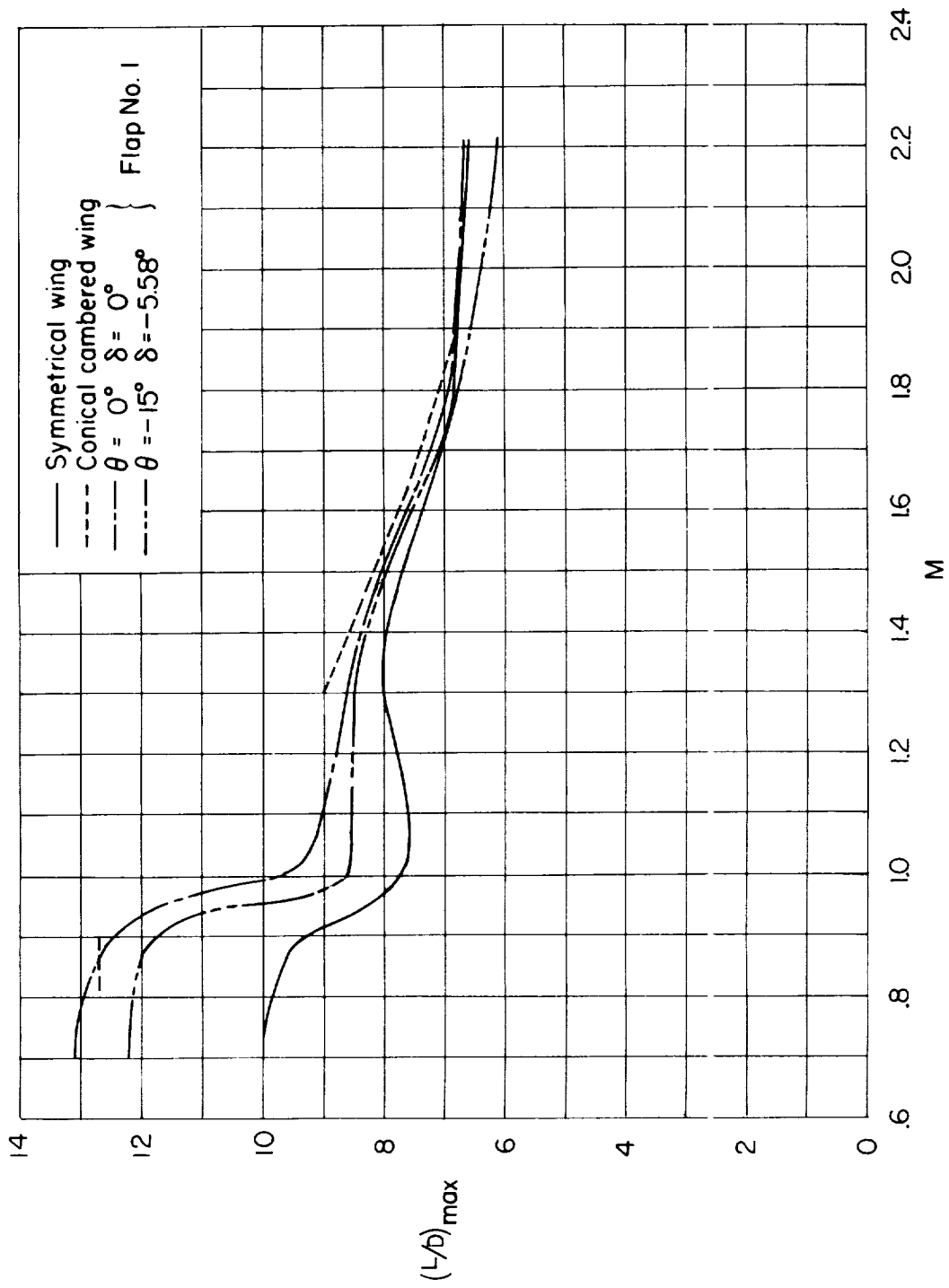


Figure 6.- Variation of maximum lift-drag ratio with Mach number.

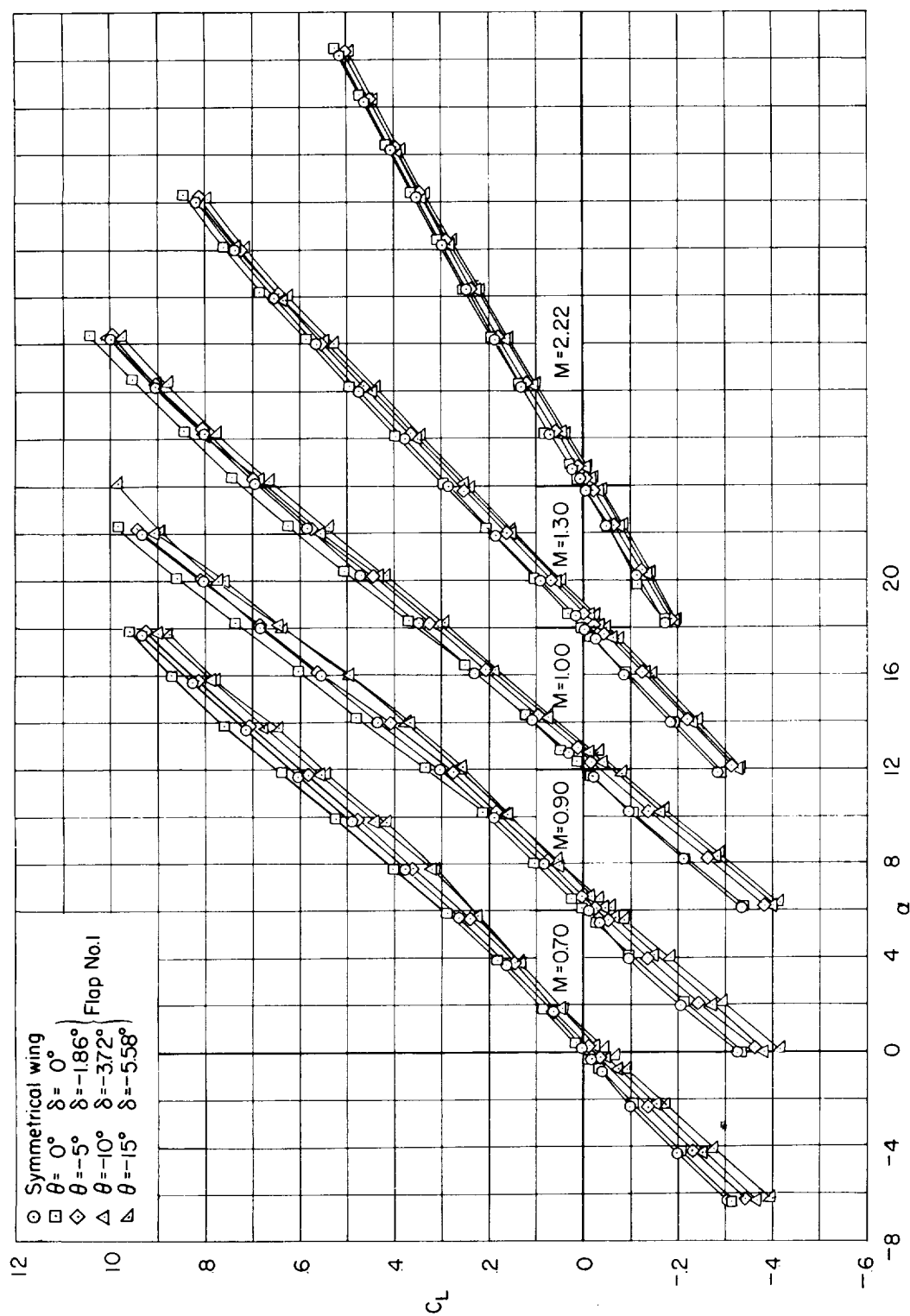


Figure 7.- Variation of lift coefficient with angle of attack for several flap deflections.

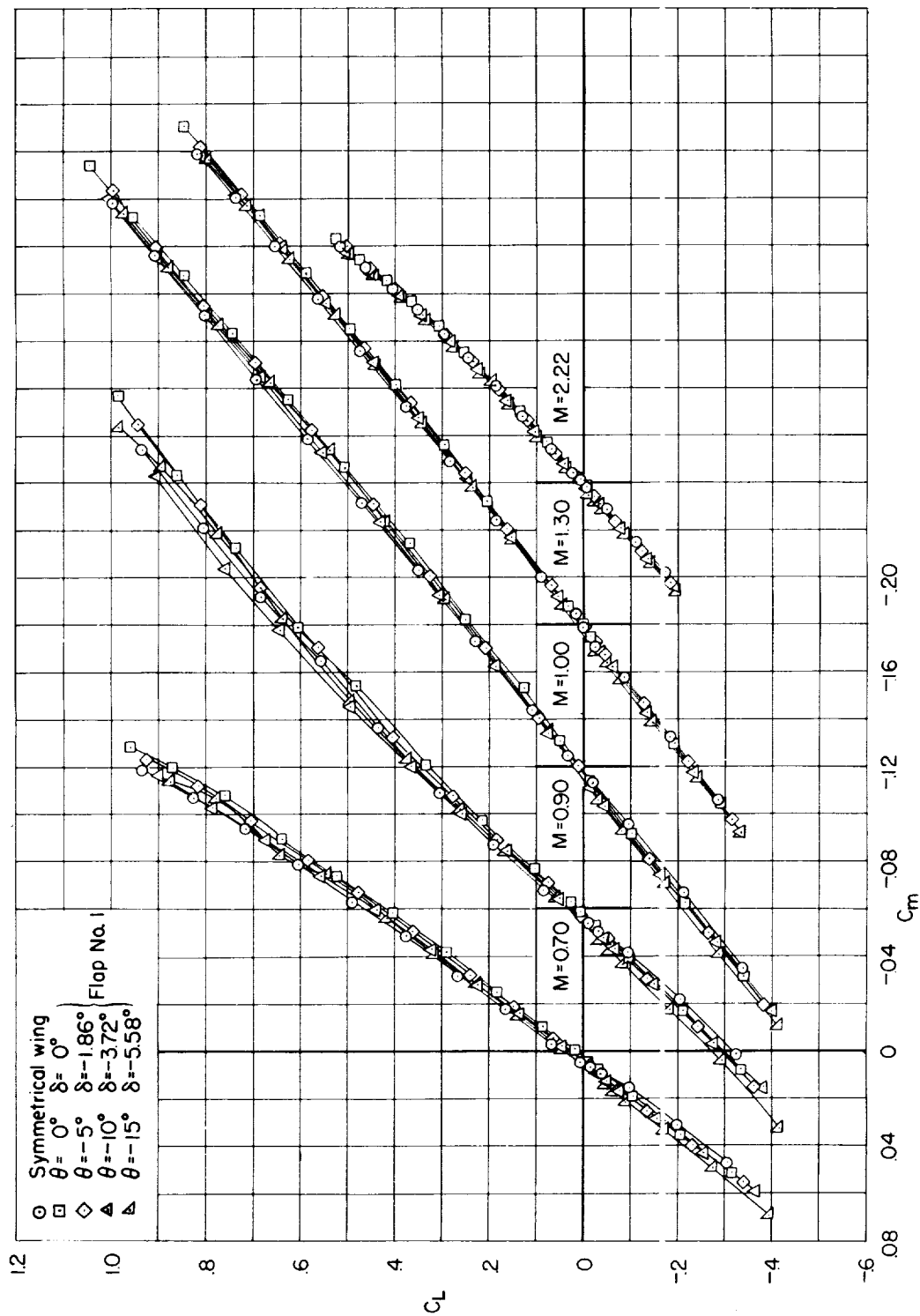


Figure 8.- Variation of pitching-moment coefficient with lift coefficient for several flap deflections.